Amendments to the Claims

This listing of claims will replace all prior version and listings of claims in the application:

Listing of Claims:

1-29. (Canceled).

30. (Previously presented): A method for desorption and ionization of analytes, comprising the steps of:

a. preparing a sample having analytes and a polyacrylamide medium having at least one component;

b. selecting a resonant vibrational mode of at least one component of the medium;

c. selecting a laser tuned to emit light substantially at the wavelength of the selected vibrational mode; and

d. irradiating the sample with laser light to cause medium ablation and desorption and ionization of the analytes,

wherein the preparing step comprises a step of stabilizing the sample for compatibility with high-vacuum conditions, wherein the stabilizing step comprises a step of freezing the sample at a sufficiently low temperature so that at least part of the sample has a phase transition.

31. (Original): The method of claim 30, wherein the freezing step comprises the steps of placing the sample in a sample support, and immersing the sample support in liquid nitrogen for a period of time so that any water within the sample changes to ice.

32. (Previously presented): A method for desorption and ionization of analytes, comprising the steps of:

e. preparing a sample having analytes and a polyacrylamide medium having at least one component;

f. selecting a resonant vibrational mode of at least one component of the medium;

g. selecting a laser tuned to emit light substantially at the wavelength of the selected vibrational mode; and

h. irradiating the sample with laser light to cause medium ablation and desorption and ionization of the analytes,

wherein the preparing step comprises a step of stabilizing the sample for compatibility with high-vacuum conditions, wherein the stabilizing step comprises a step of freezing the sample at a sufficiently low temperature so that at least part of the sample has an increase in viscosity and a decrease in vapor pressure.

33-46. (Canceled).

47. (Previously presented): The method of claim 62, further comprising the steps of:

a. selecting a resonant vibrational mode of at least one component of the medium; and

b. selecting an energy source to emit short-pulse radiation substantially at the wavelength of the selected resonant vibrational mode.

48. (Original): The method of claim 47, wherein the energy source is a laser.

49. (Original): The method of claim 48, wherein the laser is a free electron laser.

50. (Original): The method of claim 49, wherein the free electron laser is tunable to generate short-pulse radiation.

51. (Original): The method of claim 48, wherein the laser is a solid state laser.

52. (Original): The method of claim 51, wherein the solid state laser is tunable to generate short-pulse radiation.

53. (Original): The method of claim 48, wherein the laser is a gas laser.

54. (Original): The method of claim 48, wherein the laser is a metal vapor laser.

55. (Original): The method of claim 47, wherein the step of selecting a resonant vibrational mode comprises a step of locating the resonant vibrational mode from a Fourier-transform infrared absorption spectrum of the medium.

56. (Previously presented): The method of claim 62, wherein the freezing step comprises the steps of placing the sample in a sample support, and immersing the sample support in liquid nitrogen for a period of time so that any water within the sample has a phase transition to change to ice.

57. (Previously presented): A method for desorption and ionization of analytes, comprising the steps of:

a. preparing a sample having analytes in a medium including at least one component;
b. freezing the sample at a sufficiently low temperature so that at least part of the sample has an increase in viscosity and a decrease in vapor pressure; and
c. irradiating the frozen sample with short-pulse radiation to cause medium ablation and desorption and ionization of the analytes,

wherein the step of preparing a sample comprises a step of spatially separating the analytes within the medium by electrophoresis.

58. (Original): The method of claim 57, wherein the step of irradiating the frozen sample comprises a step of irradiating sequentially a plurality of positions within the frozen sample, wherein at least two irradiated positions correspond to locations of the spatially separated analytes.

59. (Original): The method of claim 58, wherein each of the plurality of positions is irradiated by radiation delivered in pulses, each pulse having a duration of less than the relaxation time of a selected vibrational mode of at least one component of the medium, wherein the pulses are separated in time by intervals, each interval having a duration of at least ten times the relaxation time of the selected vibrational mode.

60. (Original): The method of claim 58, wherein each of the plurality of positions is irradiated by radiation delivered in pulses, each pulse having a duration of less than a thermal relaxation time of the at least one component of the medium.

61. (Original): The method of claim 58, wherein each of the plurality of positions is irradiated by radiation delivered in pulses, each pulse having a duration of less than a mechanical relaxation time of the at least one component of the medium.

62. (Previously presented): A method for desorption and ionization of analytes, comprising the steps of:

a. preparing a sample having analytes in a medium including at least one component;
b. freezing the sample at a sufficiently low temperature so that at least part of the sample has an increase in viscosity and a decrease in vapor pressure; and
c. irradiating the frozen sample with short-pulse radiation to cause medium ablation and desorption and ionization of the analytes,

wherein the medium includes an electrophoresis medium.

63. (Original): The method of claim 62, wherein the electrophoresis medium comprises polyacrylamide.

64. (Previously presented): The method of claim 62, further comprising the steps of:
    a. passing the ionized analytes through a mass spectrometer; and
    b. obtaining a mass spectrum of the ionized analytes.

65. (Canceled).

66. (Previously presented): The system of claim 74, further comprising:
    a. means for selecting a resonant vibrational mode of at least one component of the medium; and
    b. means for selecting an energy source tuned to emit short-pulse radiation substantially at the wavelength of the selected resonant vibrational mode.

67. (Original): The system of claim 66, wherein the energy source is a laser.

68. (Original): The system of claim 67, wherein the laser is a free electron laser.

69. (Original): The system of claim 68, wherein the free electron laser is tunable to generate short-pulse radiation.

70. (Original): The system of claim 67, wherein the laser is a solid state laser.

71. (Original): The system of claim 70, wherein the solid state laser is tunable to generate short-pulse radiation.

72. (Original): The system of claim 66, wherein means for selecting a resonant vibrational mode comprises means for locating the resonant vibrational mode from a Fourier-transform infrared absorption spectrum of the medium.

73. (Previously presented): The system of claim 74, wherein the freezing means includes a sample support to contain the sample, and the sample support being immersed in liquid nitrogen for a period of time so that any water within the sample has a phase transition to change to ice.

74. (Previously presented): A system for desorption and ionization of analytes, comprising:

a. means for preparing a sample having analytes in a medium including at least one component;

b. means for freezing the sample at a sufficiently low temperature so that at least part of the sample has an increase in viscosity and a decrease in vapor pressure; and

c. means for irradiating the frozen sample with short-pulse radiation to cause medium ablation and desorption and ionization of the analytes,

wherein the medium includes an electrophoresis medium.

75. (Original): The system of claim 74, wherein the electrophoresis medium comprises polyacrylamide.

76. (Previously presented): The system of claim 74, further comprising means for obtaining a mass spectrum of the ionized analytes.

77-80. (Canceled).